CLAIMS

What is claimed is:

1. A process for the preparation of α-olefins, comprising, contacting at about 40°C to about 120°C in a liquid full modified plug flow reactor:

(a) an oligomerization catalyst which is an iron complex of a 2,6-pyridinecarboxaldehye(bisimine) or a 2,6-diacylpyridine(bisimine) which oligomerizes ethylene to α-olefins;

(b) ethylene;

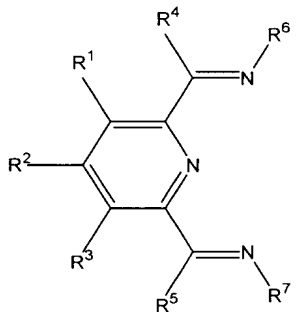
(c) an organic solvent; and

(d) optionally one or more cocatalysts;

wherein (a) plus (b) plus (c) plus (d), when present, form a process mixture, and wherein along the length of said modified plug flow reactor said oligomerization catalyst is added at two or more first addition points to said process mixture, so that a time interval for said process mixture between said addition points is about 0.3 to about 5 half lives of said oligomerization catalyst under process conditions.

2. The process as recited in Claim 1 wherein said time interval is about 0.5 to about 3.0 of said half lives.

3. The process as recited in Claim 1 wherein said 2,6-pyridinecarboxaldehye(bisimine) or 2,6-diacylpyridine(bisimine) is



(I)

wherein:

R^1, R^2 and R^3 are each independently hydrogen, hydrocarbyl, substituted hydrocarbyl or an inert functional group, provided that any two of R^1, R^2 and R^3 vicinal to one another taken together may form a ring;

R^4 and R^5 are each independently hydrogen, hydrocarbyl, substituted hydrocarbyl or an inert functional group;

R^6 and R^7 are each independently a substituted aryl having a first ring atom bound to the imino nitrogen, provided that:

in R^6, a second ring atom adjacent to said first ring atom is bound to a halogen, a primary carbon group, a secondary carbon group or a tertiary carbon group; and further provided that

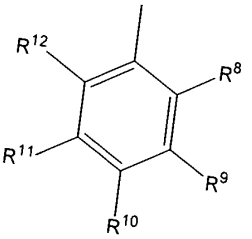
in R^6, when said second ring atom is bound to a halogen or a primary carbon group, none, one or two of the other ring atoms in R^6 and R^7 adjacent to said first ring atom are bound to a halogen or a primary carbon group, with the remainder of the ring atoms adjacent to said first ring atom being bound to a hydrogen atom; or

in R^6, when said second ring atom is bound to a secondary carbon group, none, one or two of the other ring atoms in R^6 and R^7 adjacent to said first ring atom are bound to a halogen, a primary carbon group or a secondary carbon group, with the remainder of the ring atoms adjacent to said first ring atom being bound to a hydrogen atom; or

in R^6, when said second ring atom is bound to a tertiary carbon group, none or one of the other ring atoms in R^6 and R^7 adjacent to said first ring atom are bound to a tertiary carbon group, with the remainder of the ring atoms adjacent to said first ring atom being bound to a hydrogen atom.

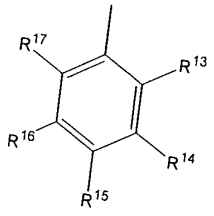
4. The process as recited in Claim 3 wherein

R^6 is



(VI)

and R^7 is



(VII)

wherein:

R^8 is a halogen, a primary carbon group, a secondary carbon group or a tertiary carbon group; and

R^9, R^{10}, R^{11}, R^{14}, R^{15}, R^{16} and R^{17} are each independently hydrogen, hydrocarbyl, substituted hydrocarbyl or a functional group;

provided that:

when R^8 is a halogen or primary carbon group none, one or two of R^{12}, R^{13} and R^{17} are a halogen or a primary carbon group, with the remainder of R^{12}, R^{13} and R^{17} being hydrogen; or

when R^8 is a secondary carbon group, none or one of R^{12}, R^{13} and R^{17} is a halogen, a primary carbon group or a secondary carbon group, with the remainder of R^{12}, R^{13} and R^{17} being hydrogen; or

when R^8 is a tertiary carbon group, none or one of R^{12}, R^{13} and R^{17} is tertiary carbon group, with the remainder of R^{12}, R^{13} and R^{17} being hydrogen;

and further provided that any two of R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16} and R^{17} vicinal to one another, taken together may form a ring.

5. The process as recited in Claim 4 wherein:

if R^8 is a primary carbon group, R^{13} is a primary carbon group, and R^{12} and R^{17} are hydrogen; or

if R^8 is a secondary carbon group, R^{13} is a primary carbon group or a secondary carbon group, more preferably a secondary carbon group, and R^{12} and R^{17} are hydrogen; or

if R^8 is a tertiary carbon group (more preferably a trihalo tertiary carbon group such as a trihalomethyl), R^{13} is a tertiary carbon group (more preferably a trihalotertiary group such as a trihalomethyl), and R^{12} and R^{17} are hydrogen; or

if R^8 is a halogen, R^{13} is a halogen, and R^{12} and R^{17} are hydrogen.

6. The process as recited in Claim 4 wherein:

R^1, R^2 and R^3 are hydrogen; and R^4 and R^5 are methyl;

R^{19}, R^{20}, R^{21}, R^{23} and R^{24} are all hydrogen; R^{22} is methyl; and R^{18} methyl; or

R^{19}, R^{20}, R^{21}, R^{23} and R^{24} are all hydrogen; R^{22} is ethyl; and R^{18} ethyl; or

R^{19}, R^{20}, R^{21}, R^{23} and R^{24} are all hydrogen; R^{22} is isopropyl; and R^{18} isopropyl; or

R^{19}, R^{20}, R^{21}, R^{23} and R^{24} are all hydrogen; R^{22} is n-propyl; and R^{18} n-propyl; or

R^{19}, R^{20}, R^{21}, R^{23} and R^{24} are all hydrogen; R^{22} is chloro or bromo; and R^{18} is a halogen.

7. The process as recited in Claim 1 which is carried out at a temperature of about 70°C to about 110°C.

8. The process as recited in Claim 1 wherein there are about 3 to about 8 of said addition points.

9. The process as recited in Claim 1, 2, 3, 4, 5, 6, 7, 8 or 9 wherein ethylene is added at two or more second addition points to said process mixture.

10. The process as recited in Claim 9 wherein said first addition points and said second addition points are the same.